1. Multiply the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = 4x^2 + 4x + 4 \text{ and } g(x) = 5x^2 + 8x + 2$$

A. The domain is all Real numbers except $x = a$, where $a \in [-12.67, -3.67]$

B. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [0.25, 6.25]$

C. The domain is all Real numbers less than or equal to $x = a$, where $a \in [-5.4, 0.6]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [3.67, 9.67]$ and $b \in [-4.33, 0.67]$

E. The domain is all Real numbers.

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2. Choose the interval below that f composed with g at $x = 1$ is in.

$$f(x) = -x^3 - 2x^2 + x \text{ and } g(x) = -4x^3 - 4x^2 + 4x + 3$$

A. $(f \circ g)(1) \in [-3.2, 0.5]$

B. $(f \circ g)(1) \in [9.5, 11.2]$

C. $(f \circ g)(1) \in [4.5, 8]$

D. $(f \circ g)(1) \in [2.6, 4.9]$

E. It is not possible to compose the two functions.

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3. Choose the interval below that f composed with g at $x = 1$ is in.

$$f(x) = -3x^3 + 4x^2 + 4x \text{ and } g(x) = x^3 - 1x^2 - 3x + 1$$

A. $(f \circ g)(1) \in [81, 89]$

B. $(f \circ g)(1) \in [28, 36]$

C. $(f \circ g)(1) \in [35, 42]$

D. $(f \circ g)(1) \in [88, 96]$

E. It is not possible to compose the two functions.

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4. Find the inverse of the function below. Then, evaluate the inverse at $x = 7$ and choose the interval that $f^-1(7)$ belongs to.

$$f(x) = e^{x-2} - 2$$

A. $f^{-1}(7) \in [-1.06, 0.03]$

B. $f^{-1}(7) \in [-0.08, 0.39]$

C. $f^{-1}(7) \in [-1.06, 0.03]$

D. $f^{-1}(7) \in [-0.08, 0.39]$

E. $f^{-1}(7) \in [3.32, 4.75]$

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5. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = -12$ and choose the interval that $f^-1(-12)$ belongs to.

$$f(x) = \sqrt[3]{2x - 5}$$

A. $f^{-1}(-12) \in [-863.5, -860.5]$

B. $f^{-1}(-12) \in [-866.5, -865.5]$

C. $f^{-1}(-12) \in [866.5, 870.5]$

D. $f^{-1}(-12) \in [855.5, 862.5]$

E. The function is not invertible for all Real numbers.

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6. Find the inverse of the function below. Then, evaluate the inverse at $x = 9$ and choose the interval that $f^-1(9)$ belongs to.

$$f(x) = e^{x-5} + 2$$

A. $f^{-1}(9) \in [6.88, 7.09]$

B. $f^{-1}(9) \in [-3.15, -2.83]$

C. $f^{-1}(9) \in [4.54, 4.85]$

D. $f^{-1}(9) \in [4.28, 4.42]$

E. $f^{-1}(9) \in [3.38, 3.42]$

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7. Determine whether the function below is 1-1.

$$f(x) = 25x^2 - 90x - 319$$

A. No, because the range of the function is not $(-\infty, \infty)$.

B. No, because the domain of the function is not $(-\infty, \infty)$.

C. No, because there is a y-value that goes to 2 different x-values.

D. No, because there is an x-value that goes to 2 different y-values.

E. Yes, the function is 1-1.

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8. Determine whether the function below is 1-1.

$$f(x) = 9x^2 - 60x + 100$$

A. No, because there is a y-value that goes to 2 different x-values.

B. No, because the range of the function is not $(-\infty, \infty)$.

C. No, because the domain of the function is not $(-\infty, \infty)$.

D. Yes, the function is 1-1.

E. No, because there is an x-value that goes to 2 different y-values.

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9. Subtract the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = \frac{5}{3x - 20} \text{ and } g(x) = 7x + 3$$

A. The domain is all Real numbers greater than or equal to $x = a,$ where $a \in [-7.4, 3.6]$

B. The domain is all Real numbers less than or equal to $x = a,$ where $a \in [2, 4]$

C. The domain is all Real numbers except $x = a$, where $a \in [5.67, 7.67]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [-0.33, 8.67]$ and $b \in [2.83, 11.83]$

E. The domain is all Real numbers.

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10. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = 14$ and choose the interval that $f^-1(14)$ belongs to.

$$f(x) = 5x^2 - 4$$

A. $f^{-1}(14) \in [2.69, 3.04]$

B. $f^{-1}(14) \in [5.7, 5.94]$

C. $f^{-1}(14) \in [0.88, 1.83]$

D. $f^{-1}(14) \in [1.81, 2.14]$

E. The function is not invertible for all Real numbers.
